

like a plateau. It is a phenomenon of much importance in connection with the inquiries into the formation of the Hawkesbury rocks, and the excavation of the Blue Mountain valleys.

ON THE EDIBLE OYSTERS FOUND ON THE AUSTRALIAN AND
NEIGHBOURING COASTS.

By J. C. COX, M.D., F.L.S., &c.

Some months ago I read before this Society a paper on the Edible Oysters found on the Australian and adjacent Coast, and exhibited specimens to illustrate my remarks. I stated that we had five distinct species of Oysters on the coast of New South Wales proper. First the Mud Oyster—*Ostrea Angasi*, Sowb., secondly the Rock Oyster—*Ostrea glomerata*, Gould, third the Drift Oyster—*Ostrea subtrigona*, Sowb., all of commercial value; fourth *Ostrea circumscuta*, Gould, and fifth *Ostrea virescens*, Angas, only of interest to the Conchologist.

My paper as published attracted the attention of a critic who is not only a successful commercial cultivator of our Oysters, but who is a close and careful observer, and who has the preservation and culture of our Oysters at heart for no selfish purpose but as a public good. Mr. Woodward pointed out in the public press that he thought I was wrong in considering our Rock Oyster and our Drift Oyster distinct species, and founded his conclusions from practical observations made by himself on his Oyster Beds on the Walambi at Cape Hawke two miles above the village of Forster. Mr. Woodward has recently paid a visit to his Oyster Beds and has selected from four of them specimens of Oysters for me to illustrate his reasons for differing with me, and I now exhibit these specimens to you; but instead of proving to me that I am wrong these specimens have only the more firmly convinced me that my theory of the replenishing of our exhausted Oyster Beds is the correct and only one to be depended on.

There are circumstances connected with these extensive and well conducted fisheries which are not generally known, and which I am desirous with Mr. Woodward's permission of placing on record.

These Oyster Banks are at the mouth of what is known as Swan Bay. At the entrance of the Wallambi River into Swan Bay, there is a bank across the mouth of the river composed of coarse Cockle Shell sand, through which a narrow channel has been cut by the Government to permit of boats and traffic to pass. The samples of Oysters exhibited are marked Nos. 1, 2, 3, and 4. The Oysters marked No. 3, are says Mr. Woodward in his letter to me "real Bank Oysters, they grow on a bank upon which there is never more than one foot of water at high-water and six inches at low-water at ordinary tides but for four or five tides one after the other at spring tide time the water does not cover them at all. These Oysters are of a good age and if left on the bank where they grow they never improve better than they are now; I have never seen them as good as they are now" (25th August, 1882). The samples exhibited marked No. 2 and 4, are Oysters, says Mr. Woodward, "which were removed from the above mentioned bed about twelve months ago, a few of them two years ago, and placed on other beds; those from one of these newly formed beds lie in water about eighteen inches deep at high, and twelve inches at low tide, and only have six inches of water over them at spring tide; these new beds are about 300 yards from the original bed."

The true Drift Oysters exhibited marked No. 1, are from a bed up the river about 600 yards from the exposed bed first mentioned, the bottom of which is Sandy Mud, it has about two feet of water over it at high water, and eighteen inches over it at low-water, and twelve inches of water over it at spring low-water tides. These large fine Oysters taken from it says Mr. Woodward, "have not been taken from the first mentioned exposed bed and deposited there, but are its natural production, they nevertheless

spawn at the same time (25th August) as those do at the first mentioned exposed bed." The difference in size Mr. Woodward believes to be entirely attributable to their being always covered with water, but in this I differ with him.

Some notion of the value of this important fishery may be made when I tell you that Mr. Woodward has during his recent trip to Cape Hawke superintended the laying down of 3,000 sacks or 9,000 bushels of the oysters from the last mentioned exposed bed to the other beds in the vicinity; a sack of oysters at present is valued at £2, so that this last operation represents a value of £6,000.

On the above facts Mr. Woodward thinks that the Rock Oyster and the Drift Oyster are one and the same species, but I feel quite sure that the more this subject is studied the more certain it will be proved that you cannot replenish the Drift Oyster beds with Rock Oysters. No doubt Rock Oysters will improve when placed in a position where they receive more nourishment, such as the position where Mr. Woodward has from watchful care and experience placed them in, but this does not prove that they will live and thrive and alter their character so much if deposited at the bed up the river in deeper water as to be converted into another species.

For many years I have dredged in our Australian Coast waters, and my friend Mr. Brazier has had still larger experience in dredging than I have in these waters, but Mr. Brazier tells me he has never known a Rock Oyster dead or alive from deep beds such as are occupied by our Drift Oysters, and I certainly endorse his opinion. If they were the same would you not expect that at least in some position you would be able to trace the beds of Drift Oysters running direct into the beds of the Rock Oysters. The finest Rock Oysters are found in greatest perfection a few inches below dead low water mark, but you never find them under any circumstances in deeper water attached or

unattached unless placed there artificially, and then they will not, I think, thrive well if placed much under a foot deep of water at dead low water. Surely the spat from the extensive beds of the Drift Oyster would sometimes find a resting place on stakes or other objects below the position which Rock Oysters are found, but such is not the case. It is argued that this arises from the fact that the spat when emitted from the Drift Oysters rises instantly to the surface and is then drifted still on the surface to the nearest rocks or other objects and there attaches itself; if this were the case, why is it that the stakes which were driven into the mud so much used in former times to mark the position of Drift Oyster beds were never found to have Oysters attached to them all the way up where they stood in the water, I have myself pulled up many of these stakes on purpose to examine into this point but could never discover an instance in which it occurred.

There are some circumstances connected with the Hawkes Bay Oyster Beds which are well worthy of record, and although contrary to the usual course of tidal events goes far in my opinion to show the difference between the Rock and Drift Oyster. As a rule the Rock Oyster beds are covered deeper with water at high spring tide time than at any other, but in this particular instance, these Rock or "real Bank Oysters" as Mr. Woodward calls them, are absolutely uncovered with water "for four or five tides one after another" at spring tide time, this arises from the very narrow entrance of this bay out to sea: the water from the bay has time to all run out of it, but owing to the intricate nature of the channel up to these beds, and the many small islands just inside the narrow entrance to the sea, the water does not or cannot flow in sufficiently quick to fill the bay—having been previously so thoroughly emptied—to cover this valuable bank of Oysters, hence the unusual occurrence of their being left high and dry for four or five tides at spring tide time.

It is extremely to be regretted that through an unaccountable oversight the framers of our present Fisheries Act have failed to protect our Rock Oyster beds from wilful waste and destruction, the definition of "Natural Oyster beds" is so worded that it only protects Oysters from being removed at any time from beds below low water mark. Such valuable Banks as I have just described, and in fact all our shore Oysters attached to rocks are legislated for under our Fisheries Act only so far as giving persons the right to lease them, which leases it is found impracticable to issue. In Queensland the Oyster beds are divided into two classes—Dredge Oysters and Bank Oysters. The former are leased at auction for a term of seven years, subject to certain restrictions, the latter are worked under license.

The period which an Oyster will live when taken from its natural bed and left out of water, is a proof in the opinion of many who have given much attention to this subject that our Drift Oysters differ from the Rock Oysters, and it certainly appears true from what experiments I have been able to make, that our Rock Oysters will live much longer when so removed from the water than the Drift Oyster, I suspect it is this power of endurance which is favouring at present the active cultivator of the Rock Oyster in preference to the Drift Oyster.

The other specimens of Oysters exhibited are from Townsville, Queensland, they are very fine specimens of the common Queensland Rock Oyster—*Ostrea mordax* of Gould, and which it would be unpardonable for any one to mistake or confuse with the Rock Oyster of our shores: these Oysters extend for fifty miles north of Cardwell, a point much further north than I had known them to extend when I wrote my paper on the Edible Oysters of Australia, published in this Journal some months ago.

I have also ascertained through my friend and able Conchologist Mr. G. Neville of the Calcutta Museum that our Rock Oyster—*Ostrea glomerata* extends as far north as Moreton Bay

in Queensland, but only very sparingly so, I believe that that is the absolute northern limit of the species.

NOTES AND EXHIBITS.

Prof. Stephens exhibited specimens of rocks and fossils illustrative of his paper upon the Western Coal-fields, together with examples of Siluro-Devonian Brachiopoda from the Murrumbidgee near Yass, and from the Minjary Ranges near Tumut, apparently identical with those from Mount Lambie and Coco Creek.

Dr. Cox exhibited samples of Oysters from the beds leased by Mr. Woodward at Swan Bay, near Cape Hawke. These were of three distinct types; first, those designated by Mr. Woodward as the Bank Oysters, secondly those which had been taken from the same bank and which had been improved by being placed in more favourable waters; and third, large Drift Oysters taken from their natural bed about 600 yards above where the Bank Oysters were taken from. Also a torch from the Duke of York Island, composed of a resinous substance enclosed in large leaves. These torches are used by the natives at night to attract fish.

Mr. E. P. Ramsay exhibited specimens of Sandstone, of Shale containing fossil plant impressions, and of Coal, from Nancarrow's new Coal Mines between Dubbo and Wellington. Also specimens of Fire Clay and Burnt Ironstone from the same locality. Also three stone implements from Samoa, which had been dug up in forming a Plantation, at a depth of five feet from the surface. They were found on a sandy bottom supposed to be a raised beach, by Mr. Parkinson of Samoa. One of them was a large flat chopper-like implement with a sharp cutting edge and a thick blunt back—about two feet in length, five inches in breadth, and two inches in thickness. The second was an adze found in the same place of a different material from that at